

What is claimed is:

1. An isolated <sup>Ps</sup>p45 protein comprising at least one of the following:
  - (a) the amino acid sequence of SEQ ID NO: 4 comprising a conservative amino acid substitution; and
  - (b) an amino acid sequence that has at least 70% identity with the amino acid sequence of SEQ ID NOs: 2 or 4.
- 10 2. An isolated antigenic fragment of the <sup>Ps</sup>p45 protein of Claim 1.
3. A recombinant polypeptide comprising the amino acid sequence of the <sup>Ps</sup>p45 protein of Claim 1 or the antigenic fragment of Claim 2.
- 15 4. The recombinant polypeptide of Claim 3 that is a chimeric protein.
5. An antibody raised against at least one of the following:
  - (a) the isolated <sup>Ps</sup>p45 protein of Claim 1;
  - 20 (b) the isolated antigenic fragment of Claim 2;
  - (c) the recombinant polypeptide of Claim 3; and
  - (d) the recombinant polypeptide of Claim 4.
- 25 6. An isolated or recombinant nucleic acid encoding at least one of the following:
  - (a) the isolated <sup>Ps</sup>p45 protein of Claim 1;
  - (b) the isolated antigenic fragment of Claim 2;
  - (c) the recombinant polypeptide of Claim 3; and
  - (d) the recombinant polypeptide of Claim 4.
- 30 7. The nucleic acid of Claim 6 comprising a nucleotide sequence selected from the group consisting of SEQ ID NO:1 and SEQ ID NO:3.

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8. A nucleic acid that hybridizes to the nucleotide sequence of Claim 7; wherein said nucleic acid comprises at least 12 nucleotides.
9. An expression vector, comprising the nucleic acid of any of 5 Claims 6-8, and a transcriptional control sequence, wherein the nucleic acid is operatively linked to the transcriptional control sequence.
10. A host cell that comprises the expression vector of Claim 9.
11. A method for producing a recombinant polypeptide comprising culturing the host cell of Claim 10 in a culture medium, wherein the host cell expresses the nucleic acid encoding the recombinant polypeptide; and whereby the recombinant polypeptide is produced.
12. The method of Claim 11 wherein the host cell is an *E. coli* cell.
13. A method of obtaining a purified recombinant polypeptide comprising purifying the recombinant polypeptide produced by the method of Claim 12 from the culture medium.
14. The purified recombinant polypeptide obtained by the method of Claim 13.
15. A recombinant *Yersinia ruckeri* cell comprising the nucleic acid of any of Claims 6-8.
16. The recombinant *Yersinia ruckeri* cell of Claim 15 that has the BCCM accession No. of LMG P-22044.
17. A *Yersinia ruckeri* cell having the BCCM accession No. LMG P-22511.

18. A vaccine that comprises at least one of the following:

- (a) the isolated <sup>P<sub>s</sub></sup>p45 protein of Claim 1;
- (b) the isolated antigenic fragment of Claim 2;
- (c) the recombinant polypeptide of Claim 3; and
- 5 (d) the recombinant polypeptide of Claim 4.

19. A vaccine that comprises the nucleic acid of any of Claims 6-8.

20. A vaccine comprising the recombinant *Yersinia ruckeri* cell of  
10 Claim 15 or 16.

21. The vaccine of Claim 20, wherein said recombinant *Yersinia ruckeri* cell is a bacterin.

15 22. A vaccine comprising the recombinant *Yersinia ruckeri* cell of Claim 17.

23. The vaccine of Claim 22, wherein said recombinant *Yersinia ruckeri* cell is a bacterin.

20 24. The vaccine of Claim 23, further comprising a second *Yersinia ruckeri* cell having the BCCM accession No. LMG P-22044, wherein said second *Yersinia ruckeri* cell is a bacterin.

25 25. The vaccine of any of Claims 18-24 further comprising an antigen obtained from an Infectious Pancreatic Necrosis (IPN) virus.

26. The vaccine of Claim 25 wherein the antigen obtained from the IPN virus is selected from the group consisting of the VP2 var protein and the VP3 protein.

30 27. The vaccine of any of Claims 18-24 further comprising both the VP2 var protein and the VP3 protein from Infectious Pancreatic Necrosis (IPN) virus.

28. The vaccine of Claim 27 wherein the VP2 var protein is obtained from a transformed *Pichia pastoris* cell, BCCM Accession No. IHEM 20069 and the VP3 protein is obtained from a transformed *Pichia pastoris* cell, BCCM Accession No. IHEM 20071.

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29. The vaccine of Claim 27 wherein the VP2 var protein is obtained from a transformed *Pichia pastoris* cell, BCCM Accession No. IHEM 20070 and the VP3 protein is obtained from a transformed *Pichia pastoris* cell, BCCM Accession No. IHEM 20071.

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30. The vaccine of any of Claims 18-29 that further comprises an antigen obtained from *Aeromonas salmonicida*.

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31. A method of protecting a fish from salmonid rickettsial septicemia comprising administering to the fish the vaccine of any of Claims 18-30.

32. The method of Claim 31 wherein the fish is a teleost.

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33. The method of Claim 32 wherein the teleost is a salmonid.

34. A method of protecting a fish from salmonid rickettsial septicemia and Infectious Pancreatic Necrosis comprising administering to the fish the vaccine of any of Claims 25-30.

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35. The method of Claim 34 wherein the fish is a salmonid.

36. The method of Claim 33 or 35 wherein the salmonid is selected from the group consisting of a *Salmo salar* (Atlantic salmon), an *Oncorhynchus kisutch* (coho salmon) and an *Oncorhynchus mykiss* (rainbow trout).

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37. A vaccine to protect against an intracellular pathogen for use in a non-human animal comprising a recombinant enteric bacterium that encodes a surface antigen of the intracellular pathogen.

5 38. The vaccine of Claim 37 wherein the recombinant enteric bacterium is inactivated.

10 39. The vaccine of Claim 38 wherein the non-human animal is a fish.

15 40. The vaccine of Claim 39 wherein the surface antigen is an outer membrane protein.

41. The vaccine of Claim 40 wherein the recombinant enteric bacterium is *Yersinia ruckeri*.

20 42. A method of vaccinating a non-human animal comprising administering to the non-human animal the vaccine of any of Claims 37-41.